

IN THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application.

1. (Canceled)

2. (Original) A solid image pickup apparatus comprising:

a pixel string in which a plurality of photoelectric converting sections corresponding to pixels are arranged in one string;

a CCD register, adjacently arranged to said pixel string, for successively transferring, in a predetermined direction, signal charges photoelectrically converted in the respective photoelectric converting sections;

a transfer electrode for supplying a voltage for transferring to said CCD register;

n (n is an integer of two or more) pieces of wiring layers formed in lamellar shape above said transfer electrode and its periphery via an insulating layer; and

a contact formed in a strip shape along electric charge transfer direction of said CCD register to at least one location between the transfer electrode and the wiring layer and between two wiring layers vertically adjacent to each other via said insulating layer.

3. (Original) A solid image pickup apparatus comprising:

a pixel string in which a plurality of photoelectric converting sections corresponding to pixels are arranged in one string;

a CCD register, adjacently arranged to said pixel string, for successively transferring, in a predetermined direction, signal charges photoelectrically converted in the respective photoelectric converting sections;

n (n is an integer of two or more) pieces of wiring layers formed in lamellar shape above said CCD register and its periphery via an insulating layer; and

a contact formed in a strip shape along electric charge transfer direction of said CCD register in at least one location between two wiring layers vertically adjacent to each other via said insulating layer.

4. (Canceled)

5. (Original) The solid image pickup apparatus according to claim 2 wherein said wiring layer is disposed to apply a voltage to at least one of the transfer electrode of said CCD register, an electrode other than the electrode of said CCD register, and a semiconductor area.

6. (Original) The solid image pickup apparatus according to claim 3 wherein said wiring layer is disposed to apply a voltage to at least one of the transfer electrode of said CCD register, an electrode other than the electrode of said CCD register, and a semiconductor area.

7. (Currently Amended) ~~[[The]]~~ A solid image pickup apparatus ~~according to claim 1~~  
~~further~~ comprising:

a pixel string in which a plurality of photoelectric converting sections corresponding to pixels are arranged in one string;

a CCD register, adjacently arranged to said pixel string, for successively transferring, in a predetermined direction, signal charges photoelectrically converting in the respective photoelectric converting sections;

a wiring layer formed above said CCD register and its periphery via an insulating layer;

a shift electrode which is formed between said pixel string and said CCD register and which transfers, to said CCD register, the signal charges photoelectrically converted in the respective photoelectric converting sections in said pixel string;

a shift electrode wiring layer for applying a voltage for transferring electric charge to said shift electrode; and

a contact which is formed into a strip shape along a direction crossing substantially at right angles to electric charge transfer direction under said shift electrode and which connects said shift electrode to said shift electrode wiring layer.

8. (Original) The solid image pickup apparatus according to claim 2 further comprising:

a shift electrode formed between said pixel string and said CCD register, said shift electrode transferring to said CCD register the signal charge photoelectrically converted by the photoelectric converting section in said pixel string;

a shift electrode wiring layer for applying a voltage for transferring electric charge to said shift electrode; and

a contact which is formed into the strip shape along a direction crossing substantially at right angles to electric charge transfer direction under said shift electrode and which connects said shift electrode to said shift electrode wiring layer.

9. (Original) The solid image pickup apparatus according to claim 3 further comprising:

a shift electrode formed between said pixel string and said CCD register, said shift electrode transferring to said CCD register the signal charge photoelectrically converted by the photoelectric converting section in said pixel string;

a shift electrode wiring layer for applying a voltage for transferring electric charge to said shift electrode; and

a contact which is formed into the strip shape along a direction crossing substantially at right angles to electric charge transfer direction under said shift electrode and which connects said shift electrode to said shift electrode wiring layer.

10. (Original) The solid image pickup apparatus according to claim 7 further comprising:

an upper-stage wiring layer formed above said shift electrode wiring layer via the insulating layer; and

a contact which is formed into the strip shape along the electric charge transfer direction of said CCD register or along a direction crossing substantially at right angles to electric charge transfer direction under said shift electrode and which connects said shift electrode wiring layer to said upper-stage wiring layer.

11. (Original) The solid image pickup apparatus according to claim 8 further comprising:

an upper-stage wiring layer formed above said shift electrode wiring layer via the insulating layer; and

a contact which is formed into a strip shape along the electric charge transfer direction of said CCD register or along a direction crossing substantially at right angles to electric

charge transfer direction under said shift electrode and which connects said shift electrode wiring layer to said upper-stage wiring layer.

12. (Original) The solid image pickup apparatus according to claim 9 further comprising:

an upper-stage wiring layer formed above said shift electrode wiring layer via the insulating layer; and

a contact which is formed into a strip shape along the electric charge transfer direction of said CCD register or along a direction crossing substantially at right angles to electric charge transfer direction under said shift electrode and which connects said shift electrode wiring layer to said upper-stage wiring layer.

13. (Original) The solid image pickup apparatus according to claim 10 wherein said upper-stage wiring layer is formed of a polysilicon layer.

14. (Original) The solid image pickup apparatus according to claim 11 wherein said upper-stage wiring layer is formed of a polysilicon layer.

15. (Original) The solid image pickup apparatus according to claim 12 wherein said upper-stage wiring layer is formed of a polysilicon layer.

16. (Original) The solid image pickup apparatus according to claim 2 further comprising:

a first wiring layer for applying a voltage for transferring electric charge to the transfer electrode of said CCD register;

a first contact which is formed into a strip shape along the electric charge transfer direction of said CCD register and which connects said transfer electrode to said first wiring layer;

a shift electrode which is formed between said pixel string and said CCD register and which transfers the signal charges photoelectrically converted in the photoelectric converting sections in said pixel string to said CCD register;

a second wiring layer for applying the voltage for transferring electric charge to said shift electrode;

a second contact which is formed into a strip shape along a direction crossing substantially at right angles to electric charge transfer direction under said shift electrode and which connects said shift electrode to said second wiring layer;

a third wiring layer formed above said first wiring layer via the insulating layer;

a third contact which is formed into the strip shape along the electric charge transfer direction of said CCD register and which connects said first wiring layer to said third wiring layer;

a fourth wiring layer formed above said second wiring layer via the insulating layer;

a fourth contact which is formed into the strip shape along a direction crossing substantially at right angles to electric charge transfer direction under said shift electrode and which connects said second wiring layer to said fourth wiring layer; and

a shielding film formed above said third and fourth wiring layers via the insulating layer.

17. (Original) The solid image pickup apparatus according to claim 2 wherein each of the wiring layers is formed so that at least two of the wiring layers does not overlap in a vertical direction when each of the wiring layers has a gap.

18. (Original) The solid image pickup apparatus according to claim 3 wherein each of the wiring layers is formed so that at least two of the wiring layers does not overlap in a vertical direction when each of the wiring layers has a gap.

19. (Original) The solid image pickup apparatus according to claim 2 wherein:  
said CCD register comprises a first transfer electrode to which a first voltage is applied, and a second transfer electrode to which a second voltage is applied,  
the voltage for transferring electric charge is applied to said first transfer electrode from a first wiring layer,  
the voltage for transferring electric charge is applied to said second transfer electrode from a fifth wiring layer,  
said first transfer electrode is connected to said first wiring layer via a first contact formed into a strip shape along the electric charge transfer direction of said CCD register, and  
said second transfer electrode is connected to said fifth wiring layer via a plurality of contacts formed at predetermined intervals.

20. (Currently Amended) ~~[[The]]~~ A solid image pickup apparatus ~~according to claim 7 further~~ comprising:

a pixel string in which a plurality of photoelectric converting sections corresponding to pixels are arranged in one string;

a CCD register, adjacently arranged to said pixel string, for successively transferring, in a predetermined direction, signal charges photoelectrically converted in the respective photoelectric converting sections;

a wiring layer formed above said CCD register and its periphery via an insulating layer;

a shift electrode which is formed between said pixel string and said CCD register and which transfers, to said CCD register, the signal charges photoelectrically converted in the respective photoelectric converting sections in said pixel string;

a shift electrode wiring layer for applying a voltage for transferring electric charge to said shift electrode;

~~a conductive layer intermittently formed above said shift electrode via the insulating layer;~~

a wiring layer formed above said conductive layer via the insulating layer; and

a contact which is formed into a strip shape along a direction crossing substantially at right angles to electric charge transfer direction under said shift electrode and which connects said shift electrode to said wiring layer at a gap position of said conductive layer.

21. (Canceled)

22. (Original) The solid image pickup apparatus according to claim 2 further comprising:

a diffusion area formed adjacent to said CCD register;

a substrate wiring layer for applying a predetermined voltage to a substrate through said diffusion area; and

a contact which is formed into a strip shape along the electric charge transfer direction of said CCD register and which connects said diffusion area to said substrate wiring layer.



23. (Original) The solid image pickup apparatus according to claim 3 further comprising:

a diffusion area formed adjacent to said CCD register;

a substrate wiring layer for applying a predetermined voltage to a substrate through said diffusion area; and

a contact which is formed into a strip shape along the electric charge transfer direction of said CCD register and which connects said diffusion area to said substrate wiring layer.

24. (Canceled)

25. (Original) The solid image pickup apparatus according to claim 2 further comprising:

an electric discharge gate, disposed in parallel with said pixel string, for discharging the signal charge photoelectrically converted in said photoelectric converting section;

a discharge wiring layer for applying an electric discharging voltage to said electric discharge gate; and

a contact which is formed into a strip shape along a direction crossing substantially at right angles to an electric discharge direction in said electric discharge gate and which connects said electric discharge gate to said discharge wiring layer.

26. (Original) The solid image pickup apparatus according to claim 3 further comprising:

an electric discharge gate, disposed in parallel with said pixel string, for discharging the signal charge photoelectrically converted in said photoelectric converting section;

a discharge wiring layer for applying an electric discharging voltage to said electric discharge gate; and

a contact which is formed into a strip shape along a direction crossing substantially at right angles to an electric discharge direction in said electric discharge gate and which connects said electric discharge gate to said discharge wiring layer.

27. (Currently Amended) ~~[[The]]~~ A solid image pickup apparatus ~~according to claim 1~~ further comprising:

a pixel string in which a plurality of photoelectric converting sections corresponding to pixels are arranged in one string;

a CCD register, adjacently arranged to said pixel string, for successively transferring, in a predetermined direction, signal charges photoelectrically converted in the respective photoelectric converting sections;

a wiring layer formed above said CCD register and its periphery via an insulating layer;

a first contact formed in a strip shape along electric charge transfer direction of said CCD register and connected to said wiring layer;

a shift electrode, formed between said pixel string and said CCD register, for transferring the signal charges photoelectrically converted in the photoelectric converting sections in said pixel string to said CCD register;

a first wiring layer for applying the voltage for transferring electric charge to said shift electrode;

a second wiring layer formed above said first wiring layer via the insulating layer; and

a second contact which is formed into a strip shape along the electric charge transfer direction of said CCD register and which connects said first wiring layer to said second wiring layer.

28. (Original) The solid image pickup apparatus according to claim 2 further comprising:

a shift electrode, formed between said pixel string and said CCD register, for transferring the signal charges photoelectrically converted in the respective photoelectric converting sections in said pixel string to said CCD register;

a first wiring layer for applying the voltage for transferring electric charge to said shift electrode;

a second wiring layer formed above said first wiring layer via the insulating layer; and

a contact which is formed into a strip shape along the electric charge transfer direction of said CCD register and which connects said first wiring layer to said second wiring layer.

29. (Original) The solid image pickup apparatus according to claim 3 further comprising:

a shift electrode formed between said pixel string and said CCD register for transferring the signal charges photoelectrically converted in the respective photoelectric converting sections in said pixel string to said CCD register;

a first wiring layer for applying the voltage for transferring electric charge to said shift electrode;

a second wiring layer formed above said first wiring layer via the insulating layer; and

a contact, formed into a strip shape along the electric charge transfer direction of said CCD register, for connecting said first wiring layer to said second wiring layer.